

Emm Bee Ltd

Drainage Strategy Report

**Site located at
Smethurst Street
Heywood**

**4 July 2023
JSD/J122**

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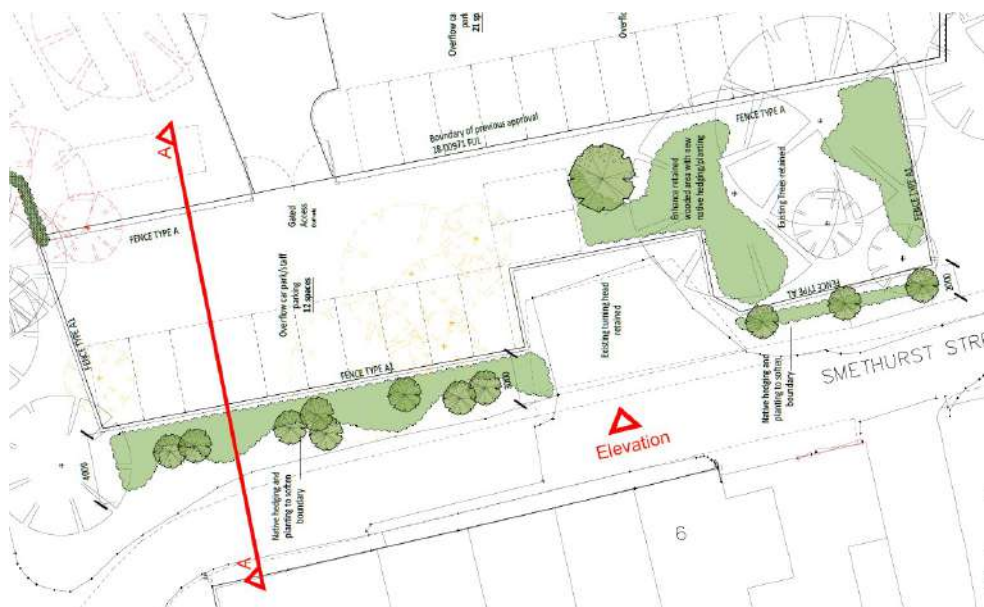
APPENDICES

Appendix A:	Topographic Survey & Proposed Site Layout Plan
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Appendix D:	Drainage Drawings:-

J122/14 – ‘Smethurst Street Overflow Car Park Details’

SCHEDULE OF REVISIONS

<u>Revision</u>	<u>Date</u>	<u>Description</u>
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1.0 Purpose of Report

- 1.1 Inchlonaig Ltd, as part of their larger motorhome sales site development are considering redeveloping this area of site, to the Southwest of the main site, as an overflow car parking area together with soft landscaping.
- 1.2 Whilst the site has been previously 'developed' i.e. Brownfield, from a drainage point of view, noting no formal drainage is present, the site would be classed as Greenfield.
- 1.3 The main development has obtained full planning approval (18/00971/FUL) and a drainage condition, No. 6, has been discharged following submission of the Drainage Strategy Report for the main site (22/00076/DOC). The supplementary planning application which has been granted for the overflow car park (22/01426/FUL) includes a drainage condition, No. 5, i.e. drainage to be considered in accordance with the drainage options hierarchy, similar to the signed-off main site planning condition above :-

"5 No development shall take place until such time as a scheme for the disposal of surface water from the site has been submitted to and approved in writing by the Local Planning Authority. The surface water drainage scheme should be based on the hierarchy of drainage options in the National Planning Practice Guidance with evidence of an assessment of the site conditions, and include details of how the scheme shall be managed after completion. The development shall be completed, maintained and managed in accordance with the approved details.

Reason: To prevent an increased risk of flooding as a result of the development and to ensure satisfactory disposal of surface water from the site in accordance with the requirements of Policy G8 of the adopted Rochdale Core Strategy and the National Planning Policy Framework.

Reason for pre-commencement condition: As the proposals require ground works, these details are required prior to commencement of any building or engineering works on site."

- 1.4 Figure 1 shows the site being located in Flood Zone 1 [low probability], a residential development [more vulnerable] of less than 1ha, is considered appropriate under the sequential test and would not require a site specific Flood Risk Assessment (FRA).

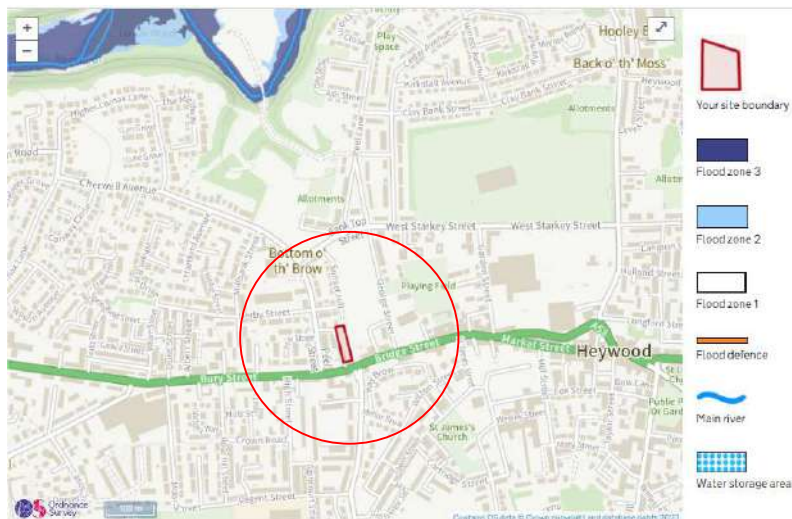


Figure 1 – Flood Zone Map

- 1.5 The drainage design should consider flood risk on site, ensure no increase in flood risk off-site due to the development and prepare the drainage strategy in accordance with the drainage hierarchy.

2.0 Site Location Details

- 2.1 The site, of 0.07 Hectares (700sq.m), generally comprises scrub and a tarmaced turning head.
- 2.2 The site is located to the East of Smethurst Street, Heywood (OL10 4QB). Site co-ordinates are 384931E, 410831N.
- 2.3 The site abuts Smethurst Street to the West, commercial business to the South and the motorhome development site to the East and public open space to the North. A Topographic survey of the site is in Appendix A.
- 2.4 Davenport Architecture Proposed Site Plan is also included in Appendix A.
- 2.5 Pluvial flood risk on and around the site is identified on Figure 2 and can be seen that there is only negligible 'low risk' depth noted to the perimeter of the site, associated with the general low area of the site, which is not considered significant for a car park.



Figure 2 – Pluvial Flood Risk

- 2.6 Figure 3 shows an extract from potential reservoir flooding, which does not highlight any significant risk.



Figure 3 – Reservoir Flood Risk

- 2.7 No other significant sources of flood risk have been identified which could adversely affect the site.

3.0 Scheme Development – Surface Water Drainage Design

- 3.1 The current Gov.uk Flood Maps do not take account of the impact of future climate change. Technical Guidance to the NPPF (February 2019) advises that the effects of climate change are likely to mean an increase in peak river flows and rainfall intensities, and that the impact of the increases should be taken into consideration in the preparation of Flood Risk Assessments.
- 3.2 The National Planning Policy Framework (NPPF) sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. DEFRA now provide climate change allowances via gov.uk website and this site falls within the Irwell Management Catchment. The development is to be designed for the 1% annual exceedance rainfall event (1 in 100 years) with the upper end allowances to 2070s (100 year design life-span) giving a climate change allowance of 45%.
- 3.3 To accommodate future small, unregulated and permitted development it is recommended that an allowance of 10% to all designed drained areas is allowed to ensure adequate capacity in the drainage system. For this site, the total drained area is 285sq.m which increased by 10% equates to 320sq.m (0.032 Ha).
- 3.4 The drainage scheme for the proposed commercial development is to be carried out in accordance with the drainage hierarchy approach in Building Regulations 2000 Approved Document H – ‘Drainage & Waste Disposal, Section H3 – Rainwater Drainage’ and DEFRA Sustainable Drainage Systems – Non-statutory technical standards for sustainable drainage systems, March 2015 i.e. infiltration, watercourse, surface water sewer, combined sewer.
- 3.5 With reference to Figure 4, extracts from BGS Geology Map 85, Manchester (Drift) it can be seen that there is expected to be Boulder Clay across the site.

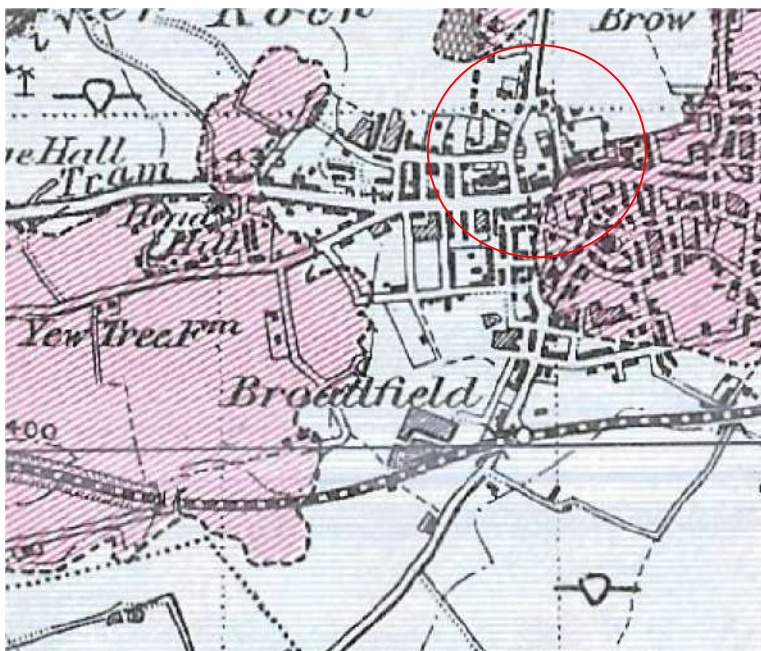


Figure 4 – Extracts from Geology Map

- 3.6 Site investigations have been previously undertaken on site by LK Consult Ltd and E3P Ltd which confirm various thicknesses of made ground across the site overlying a substantial layer of clay layer over the entire site. Extracts from E3P Ltd's Supplementary Ground Investigation report 13-224-L\$-2 dated 7 March 2023 are included in Appendix B and provide percolation test results within the shallow made ground for this area of the site (SA103). Whilst formal soakaways have been discounted, due to the clay sub-soil, permeable paving is considered suitable.

In summary the percolation test results are as follows :-

TABLE 3.4 BRE365 SOAKAWAY TESTING RESULTS

LOCATION	DEPTH (m)	MATERIAL	TEST NO.	SOIL INFILTRATION RATE (m/s)
SA101	0.82	MADE GROUND: Black gravel with frequent cobbles.	Test No.1	4.30E-05
			Test No.2	1.16E-04
			Test No.3	9.11E-05
SA102	0.75	MADE GROUND: Black Gravel.	Test No.1	1.08E-04
			Test No.2	1.48E-04
			Test No.3	1.60E-04
SA103	0.55	MADE GROUND: Black Gravel.	Test No.1	5.91E-05
			Test No.2	5.05E-05
			Test No.3	6.79E-05
SA104	0.78	MADE GROUND: Brown gravelly to very gravelly fine to coarse sand with occasional cobbles.	Test No.1	Fail

With reference to the percolation results for test location SA103, the lowest value of the 3 tests carried out in this location is $5.05 \times 10^{-5} \text{ m/s}$ (0.182m/hr), which is considered a reasonable percolation result, which is also relatively consistent across the wider site.

No evidence of past flooding/waterlogging has been identified on this site which would also indicate generally free-draining site conditions.

Therefore, in accordance with the drainage hierarchy, permeable paving infiltration is considered the appropriate drainage solution for site surface water.

- 3.7 As noted above, the site is essentially Greenfield, from a drainage point of view. Appendix D includes drawing J122/14 which confirms the site area of 700 sq.m and a proposed car parking drained area of 285sq.m, which when increased by 10% equates to 320sq.m.

As noted above, an appropriate infiltration rate for the proposed permeable paving is 0.182m/hr. With reference to Ciria R156, for drained areas between 100sq.m to 1,000sq.m a design factor of safety of 3.0 is considered appropriate where 'minor inconvenience' i.e. surface water on car parking.

The proposed permeable paving system of Terram Bodpave 85 is suitable for the proposed vehicle loading when used with a geogrid i.e. Tensar Triax and 'no-fines' sub-base stone used for temporary stormwater storage.

With reference to the MicroDrainage calculations within Appendix C it can be seen that for the 100 year event with an allowance of 45% for climate change and a total drained area of 320sq.m all water is stored within the drainage system i.e. no flooding.

Drawing J122/14 in Appendix D confirms the permeable paving layout together with indicative levels.

- 3.8 Exceedance flows have also been assessed on drawing J122/14 which generally mimic existing slopes which would therefore not increase flood risk off site.

4.0 Foul Drainage Design

- 4.1 No foul drainage is proposed at the car park site.

5.0 Maintenance

- 5.1 Whilst the drainage system is relatively maintenance free, with an anticipated design life of 20 years, should there be a need to locally repair/replace any sections of the surfacing system in the future, its modular nature would be suitable. Similarly if there is any settlement of the stone infill this can easily be 'topped-up' with a suitable coarse gravel.

6.0 Conclusions and Recommendations

- 6.1 This drainage design is proposed to satisfy the requirements of the Full Planning Application in accordance with the NPPF. All relevant drainage and flood risk considerations have been addressed.
- 6.2 Exceedance flows have been catered for by maintaining general surface slopes to ensure no increased off-site flood risk.
- 6.3 The proposed drained area (increased by 10% to allow for future creep) draining to the ground via infiltration with all water stored within the drainage system (no-fines stone) on site for up to the 100 year event with a 45% climate change allowance.
- 6.4 No foul drainage is proposed for this area of the development site.
- 6.5 All drainage and flood risk concerns associated with on and off-site sources have been addressed and demonstrate a sustainable, maintained and safe development.

6.6 This report is confined to the matters mentioned in Section 1 and no opinion is expressed or implied on matters not specifically mentioned.



J S DICKINSON
B.Eng., C.Eng., M.I.Struct.E.
On behalf of D and D Consulting Engineers Ltd

APPENDICES

Appendix A: Topographic Survey & Proposed Site Layout Plan

Appendix B: Extracts of Site Investigations

Appendix C: Drainage Design Calculations

Appendix D: Drainage Drawings

Appendix A
Topographic Survey & Proposed Site Layout Plan

[illegible]

SUITE 5 VITA HOUSE
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NORTH SHIELDS
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www.silescanltd.com

FLEETGRACE LTD			
CLIENT			
GEORGE STREET HEYWOOD			
PROJECT TITLE			
TOPOGRAPHICAL SURVEY			
DRAWING TITLE			
1:250 @ A1	DATE	28.02.18	OS
SOURCE/PROJECT	NSC/NG	APPROVED	NG
DRAWN BY			
P18041		1/2	A
		REVIEW	



Notes

Rev B: Notes updated following PC comment 2001022

Rev C: Smethurst Street elevation added

Rev D: Landscaping to refer to Smethurst Street approved, existing trees retained, parking to be arranged, fence type amended, 200722

Rev E: Fence note corrected on elevation 1101022

Turfed areas

Native Hedging mix
Refer to TBA Planting plan

Proposed Trees
Refer to TBA Planting plan

Tegula Block Paving.

Asphalt Surfacing

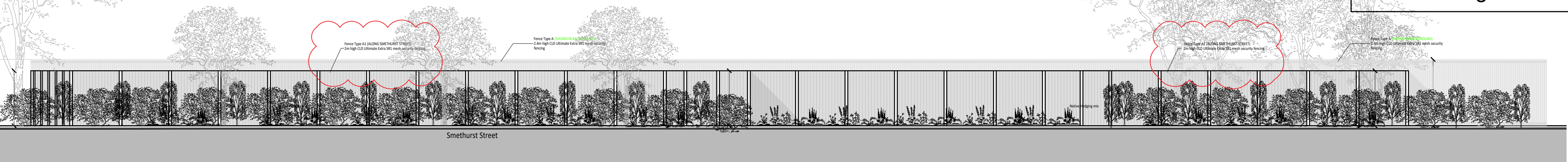
Compacted hardcore/gravel hardstanding

Type A 2.4m high
Type A1 2.0m high
CLD Ultimate Extra SR1 mesh security fencing (or similar Black

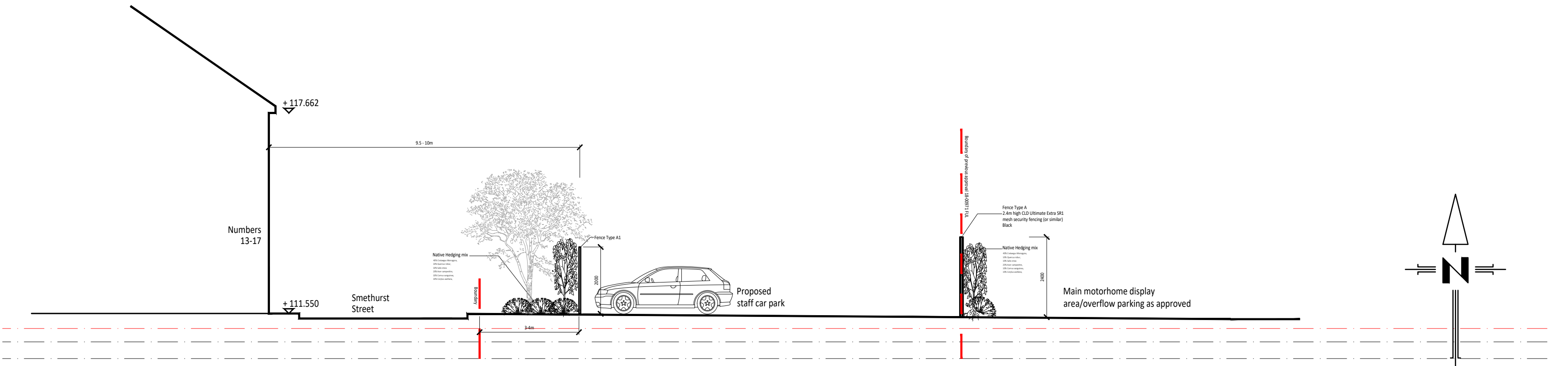
NOTES:
HATCH PATTERNS SHOWN ARE INDICATIVE ONLY AND DO NOT REPRESENT SCALE AND LAYING PATTERN
INTERNAL ROADS AND YARD AREA LAYOUT IS INDICATIVE ONLY



Existing Smethurst Street frontage



Elevation along Smethurst Street
1:100



Proposed Section A-A
1:100

da

davenport architecture

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Client

EMM BEE Motorhomes

Project

Proposed Showroom Development
George St, Heywood

Drawing Title

Smethurst Street extended parking area
Site Plan, Elevation and section

Scale

1:100

Drawn By

JD

Checked By

E

Project Number

2017-03801

Project Name

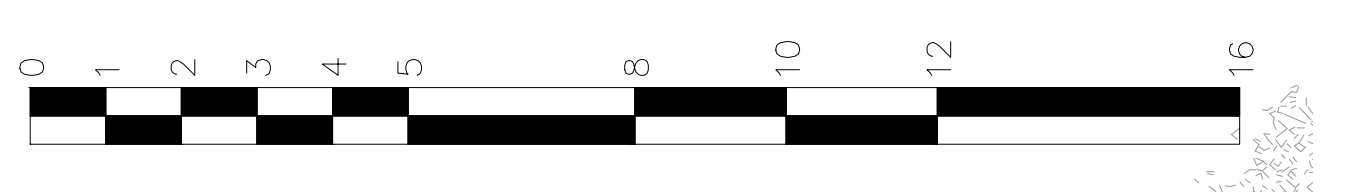
PL300

Client

Mere House
Brook Street
Knutsford
Cheshire
WA16 6DP

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Appendix B
Extracts of Site Investigations

Ref: 13-224-L4-4
Date: 9 May 2023

Katie Barker
FLEET GRACE
Prettywood
Bury
BL9-7HX

BY Email

Dear Katie,

LAND AT GEORGE STREET, HEYWOOD SUPPLEMENTARY GROUND INVESTIGATION FACTUAL LETTER REPORT

1. INTRODUCTION

1.1 BACKGROUND

E3P Ltd has been commissioned by Fleetgrace Ltd (hereafter referred to as the Client) to undertake a supplementary ground investigation to facilitate the safe delivery of the proposed redevelopment of land located off George Street, Heywood, Greater Manchester.

It is understood that Fleetgrace Ltd has agreed to purchase the subject site for future regeneration as a motor vehicle sales showroom with ancillary external hardstanding and infrastructure.

Previous phases of investigation have identified significant quantities of Made Ground deposits across the site, particularly in the western sector.

An additional phase of investigation has been undertaken as follows:

-  Trial pits to retrieve geotechnical samples from beneath proposed buildings in the eastern sector of the site;
-  Infiltration test pits to determine the potential suitability for permeable paving across the site; and,
-  Geotechnical laboratory testing (Atterberg Limits and Organic Matter Content) on soils beneath proposed buildings.

3.2 SOIL PLASTICITY

The Atterberg limits determinations, summarised in Table 3.2, show the clay to be of low plasticity, with an isolated area of high plasticity clay.

Table 3.2 Summary of Plasticity Index Test Results

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
TP203	2.00	30	20	39	19	94	17.86	Low
TP206	2.40	19	15	27	12	87	10.44	Low
TP208	1.50	31	26	59	33	100	33.00	Medium
TP211	0.60	18	17	33	16	100	16.00	Low

The results of the Atterberg limits testing confirmed that the soils would be deemed to be “Low to Medium” Volume Change Potential” in accordance with the classification system utilised by the LABC/NHBC industry guidance.

3.3 ORGANIC CONTENT

The organic matter content determinations, summarised in Table 3.3, show that the Made Ground deposits have an organic matter content ranging between 4.2% and 8.3%. The samples will likely have excluded larger gravel and cobble fragments and so represent the fine particle sizes.

TABLE 3.3 SUMMARY OF ORGANIC MATTER CONTENT

LOCATION	TOP DEPTH (m)	STRATUM	TOTAL ORGANIC CONTENT (% w/w C)	Estimate of OMC (% w/w)
TP205	1.00		5.0	8.6
TP207	0.60		5.4	9.3
TP210	0.50		8.3	14.4
TP213	1.50		4.2	7.2

3.4 SOIL INFILTRATION

In-situ BRE 365 Soakaway tests were undertaken over a 24-hour period within trial pits completed as SA101 to SA104.

The results are presented in Table 3.4 below and the test certificates are included in this letter report.

TABLE 3.4 BRE365 SOAKAWAY TESTING RESULTS

LOCATION	DEPTH (m)	MATERIAL	TEST NO.	SOIL INFILTRATION RATE (m/s)
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			Test No.3	6.79E-05
SA104	0.78	MADE GROUND: Brown gravelly to very gravelly fine to coarse sand with occasional cobbles.	Test No.1	Fail

Soil infiltration was taken over the wetted area from between 75% and 25% of the effective depth. Generally, tests showed granular Made Ground deposits to have variable soakage potential. During the tests in SA104, the water level did not fall to the 25% effective storage depth. As such, an infiltration rate could not be calculated, thus indicating the infiltration potential was significantly reduced within Made Ground comprising gravelly sand.

Considering the significant volumes of permeable granular Made Ground deposits on the site, it is considered that permeable paving is suitable for the proposed development, in conjunction with the installation of permeable paving.

It is noted that Made Ground impacted by low-level heavy metals, TPH and PAHs has previously been identified on-site, as such the use of soakaway drainage has been previously discounted.

The application of permeable paving will ultimately be dependent on the specific requirements of the development. All infiltration should be designed in accordance with BRE Special Digest 365 – *Soakaway Design* and Building Regulations.

4. GEOTECHNICAL ASSESSMENT

4.1 FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has undertaken an assessment of the net safe allowable bearing pressure (ABP) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum. The results of this assessment are summarised in Table 4.1.

TABLE 4.1 SUMMARY OF ABP

COHESIVE SOILS			
Description	Depth (range m bgl)	Undrained Shear Strength (Cu) (kN/m ²)	Allowable Bearing Pressure (kN/m ²)
Firm slightly sandy CLAY (TP201)	2.60	73.18	171.97
Stiff CLAY	0.50 – 1.40	77.49 – 138.59	182.10 – 325.69
Stiff CLAY	1.60 – 2.60	78.35 – 140.31	184.12 – 329.73

Based on the assessment of the relative undrained shear strength and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying firm to stiff CLAY, which in the area of the proposed showroom is at ca. 0.50 – 2.60 m bgl, although it should also be noted that some locations did not penetrate the Made Ground due to obstructions. Where the natural strata were recorded, exploration locations within the vicinity of the showroom indicate ABP's range from 171.97 kN/m² to 329.73 kN/m² between 0.50 – 2.60 m bgl.

Any Made Ground that is present within the site or imported as part of the upfill works will be engineered as structural fill to ensure an ABP of 50 kN/m².

4.2 FLOOR SLAB

E3P understands that the floor slab will comprise a raft that has been designed based on a 50 kN/sq.m allowable bearing pressure within any placed upfill material.

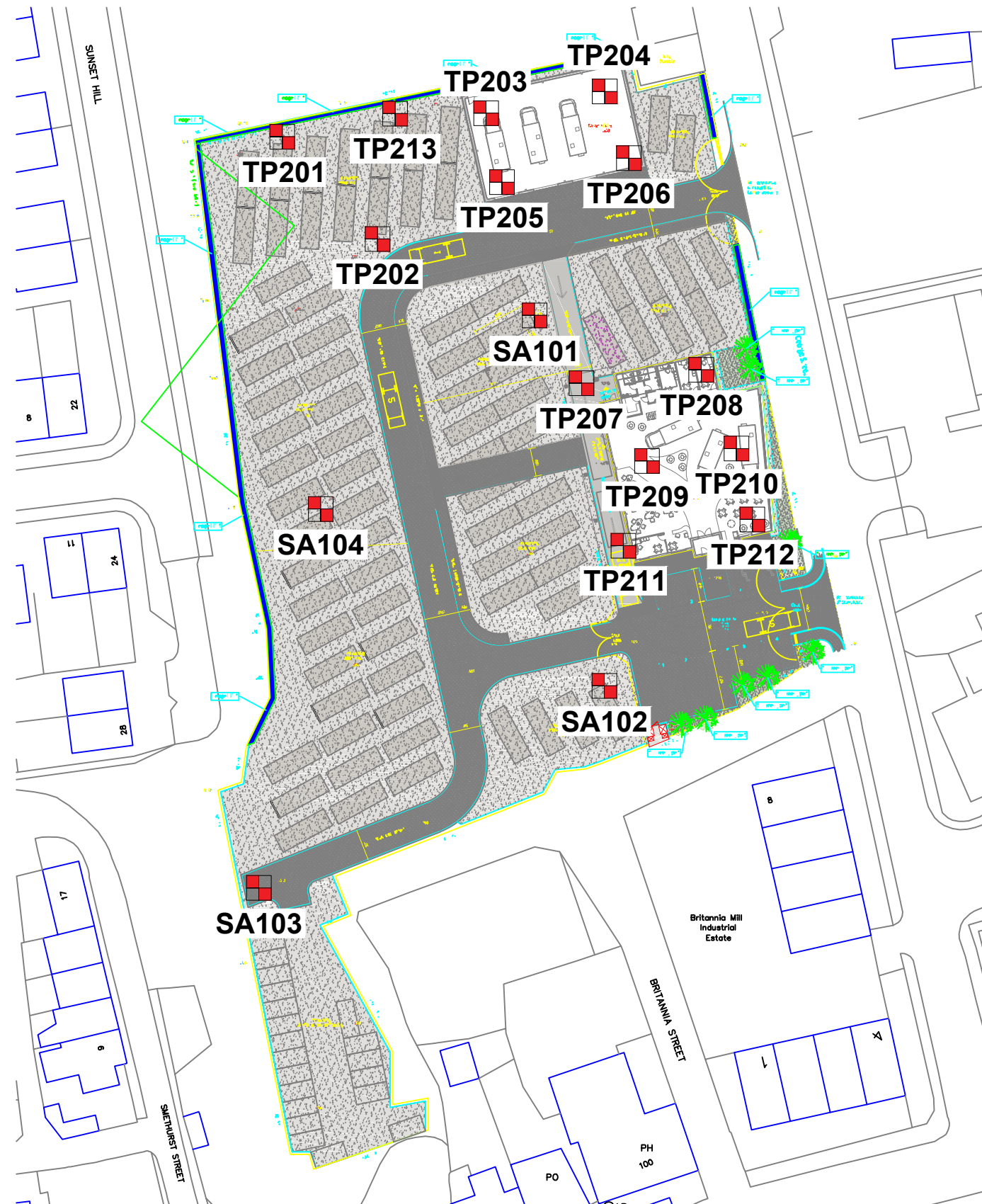
4.3 DRAINAGE

The presence of substantial depths of Made Ground across the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement. Additionally, Made Ground can be removed before future development.

The presence of shallow groundwater (slow to moderate seepage encountered within the Made Ground / above natural cohesive strata between 1.80–2.20 m bgl) would preclude the use of soakaway drainage at the site.

However, the use of shallow permeable paving is feasible given the presence of granular Made Ground deposits. Any upfill material used to create the external areas will need to be free draining with a CBR > 6% at formation.

It is noted that Made Ground impacted by low-level heavy metals, TPH and PAHs has previously been identified on-site, as such the use of soakaway drainage is not appropriate without the completion of appropriate remediation and enabling works.



Location Symbols

-  Approximate Trial Pit Location (E3P - 2023)
-  Approximate Soakaway Test Location (E3P - 2023)

Notes:

P1	REVB	02.03.2023	EB	AR
P1	REVA	13.02.2023	EB	AR
Phase	Issue	Date	Drawn	Checked

Client:

Fleet Grace

Job Title:

George Street,
Heywood

Job No:

13-224

Drawing No:

005

Date:

02.03.2023

Scale:

NTS@ A3

Drawing Title:

Exploratory Hole
Location Plan - 2023



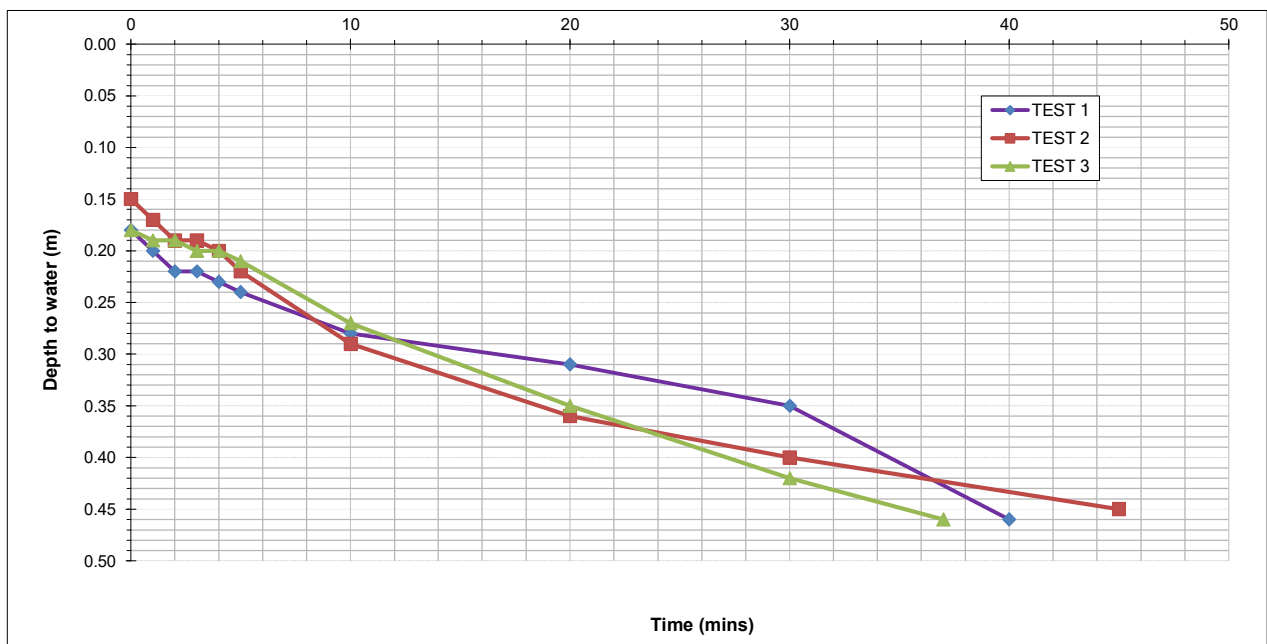
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		Site: George Street Heywood		Trial Pit Number: SA103			
		Job Number: 13-224		Length: 1.95 m			
		Date of Test: 07/02/2023		Width: 0.75 m			
				Depth: 0.55 m			
				Groundwater Level: N/A m			
Log: 0.00 - 0.55: MADE GROUND: Black gravel. Gravel is fine to coarse angular of brick, mudstone, ash, ceramic, clinker and rare plastic. Remarks - Unstable pit within Made Ground deposits. No groundwater encountered.		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0	0.18	0	0.15	0	0.18
		1	0.20	1	0.17	1	0.19
		2	0.22	2	0.19	2	0.19
		3	0.22	3	0.19	3	0.2
		4	0.23	4	0.20	4	0.2
		5	0.24	5	0.22	5	0.21
		10	0.28	10	0.29	10	0.27
		20	0.31	20	0.36	20	0.35
		30	0.35	30	0.40	30	0.42
		40	0.46	45	0.45	37	0.46
		90					
		120					
		240					
		1320					
		1380					
		1440					
		1500					
		1560					
Effective Storage Depth	m	0.37	0.40	0.37			
75% Effective Storage Depth	m	0.28	0.30	0.28			
(i.e. depth below GL)	m	0.27	0.25	0.27			
25% Effective Storage Depth	m	0.09	0.10	0.09			
(i.e. depth below GL)	m	0.46	0.45	0.46			
Effective Storage Depth 75%-25%	m	0.19	0.20	0.19			
Time to fall to 75% effective depth	mins	9.00	7.00	10.00			
Time to fall to 25% effective depth	mins	40.00	45.00	37.00			
V (75%-25%)	m3	0.27	0.29	0.27			
a (50%)	m2	2.46	2.54	2.46			
t (75%-25%)	mins	31.00	38.00	27.00			
SOIL INFILTRATION RATE	m/s	5.91E-05	5.05E-05	6.79E-05			

DESIGN SOIL INFILTRATION RATE, f	5.91E-05
----------------------------------	----------



Appendix C
Drainage Design Calculations

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 22 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	110.626	0.176	3.4	5.3	O K
30 min Summer	110.643	0.193	3.7	6.3	O K
60 min Summer	110.650	0.200	3.8	6.8	O K
120 min Summer	110.644	0.194	3.7	6.4	O K
180 min Summer	110.633	0.183	3.5	5.7	O K
240 min Summer	110.621	0.171	3.3	5.0	O K
360 min Summer	110.603	0.153	2.9	4.0	O K
480 min Summer	110.588	0.138	2.6	3.2	O K
600 min Summer	110.576	0.126	2.4	2.7	O K
720 min Summer	110.565	0.115	2.2	2.2	O K
960 min Summer	110.549	0.099	1.9	1.7	O K
1440 min Summer	110.528	0.078	1.5	1.0	O K
2160 min Summer	110.510	0.060	1.1	0.6	O K
2880 min Summer	110.499	0.049	0.9	0.4	O K
4320 min Summer	110.492	0.042	0.7	0.3	O K
5760 min Summer	110.488	0.038	0.6	0.2	O K
7200 min Summer	110.485	0.035	0.5	0.2	O K
8640 min Summer	110.483	0.033	0.4	0.2	O K
10080 min Summer	110.481	0.031	0.4	0.2	O K
15 min Winter	110.638	0.188	3.6	6.0	O K
30 min Winter	110.655	0.205	3.9	7.1	O K
60 min Winter	110.660	0.210	4.0	7.5	O K
120 min Winter	110.647	0.197	3.8	6.6	O K
180 min Winter	110.630	0.180	3.4	5.5	O K
240 min Winter	110.614	0.164	3.1	4.6	O K
360 min Winter	110.589	0.139	2.6	3.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	120.564	0.0	15
30 min Summer	83.785	0.0	23
60 min Summer	55.699	0.0	40
120 min Summer	35.663	0.0	74
180 min Summer	26.964	0.0	106
240 min Summer	21.947	0.0	138
360 min Summer	16.432	0.0	200
480 min Summer	13.354	0.0	260
600 min Summer	11.357	0.0	320
720 min Summer	9.942	0.0	378
960 min Summer	8.049	0.0	500
1440 min Summer	5.961	0.0	736
2160 min Summer	4.401	0.0	1100
2880 min Summer	3.542	0.0	1468
4320 min Summer	2.608	0.0	2200
5760 min Summer	2.101	0.0	2888
7200 min Summer	1.778	0.0	3640
8640 min Summer	1.551	0.0	4264
10080 min Summer	1.383	0.0	5128
15 min Winter	120.564	0.0	15
30 min Winter	83.785	0.0	25
60 min Winter	55.699	0.0	44
120 min Winter	35.663	0.0	80
180 min Winter	26.964	0.0	112
240 min Winter	21.947	0.0	144
360 min Winter	16.432	0.0	206

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
480 min Winter	110.570	0.120	2.3	2.4	O K
600 min Winter	110.556	0.106	2.0	1.9	O K
720 min Winter	110.544	0.094	1.8	1.5	O K
960 min Winter	110.528	0.078	1.5	1.0	O K
1440 min Winter	110.509	0.059	1.1	0.6	O K
2160 min Winter	110.497	0.047	0.8	0.4	O K
2880 min Winter	110.492	0.042	0.7	0.3	O K
4320 min Winter	110.486	0.036	0.5	0.2	O K
5760 min Winter	110.482	0.032	0.4	0.2	O K
7200 min Winter	110.480	0.030	0.3	0.2	O K
8640 min Winter	110.478	0.028	0.3	0.1	O K
10080 min Winter	110.476	0.026	0.3	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
480 min Winter	13.354	0.0	266
600 min Winter	11.357	0.0	324
720 min Winter	9.942	0.0	384
960 min Winter	8.049	0.0	500
1440 min Winter	5.961	0.0	736
2160 min Winter	4.401	0.0	1088
2880 min Winter	3.542	0.0	1444
4320 min Winter	2.608	0.0	2200
5760 min Winter	2.101	0.0	2936
7200 min Winter	1.778	0.0	3592
8640 min Winter	1.551	0.0	4328
10080 min Winter	1.383	0.0	5048

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.288	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.032

Time (mins)		Area
From:	To:	(ha)
0	4	0.032

Time Area Diagram

Total Area (ha) 0.000

Time (mins)		Area
From:	To:	(ha)
0	4	0.000

D and D Consulting Engineers Ltd		Page 4
Labyrinth Business Centre 45 Middle Hillgate Stockport SK1 3DG		
Date 04/07/2023 12:45 File SMETHURST.SRCX	Designed by jsd Checked by	
Micro Drainage		
Source Control 2020.1		

Model Details

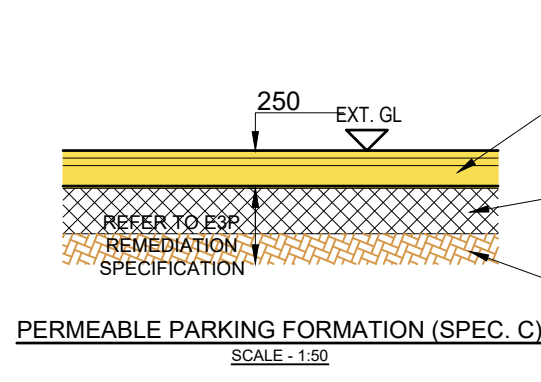
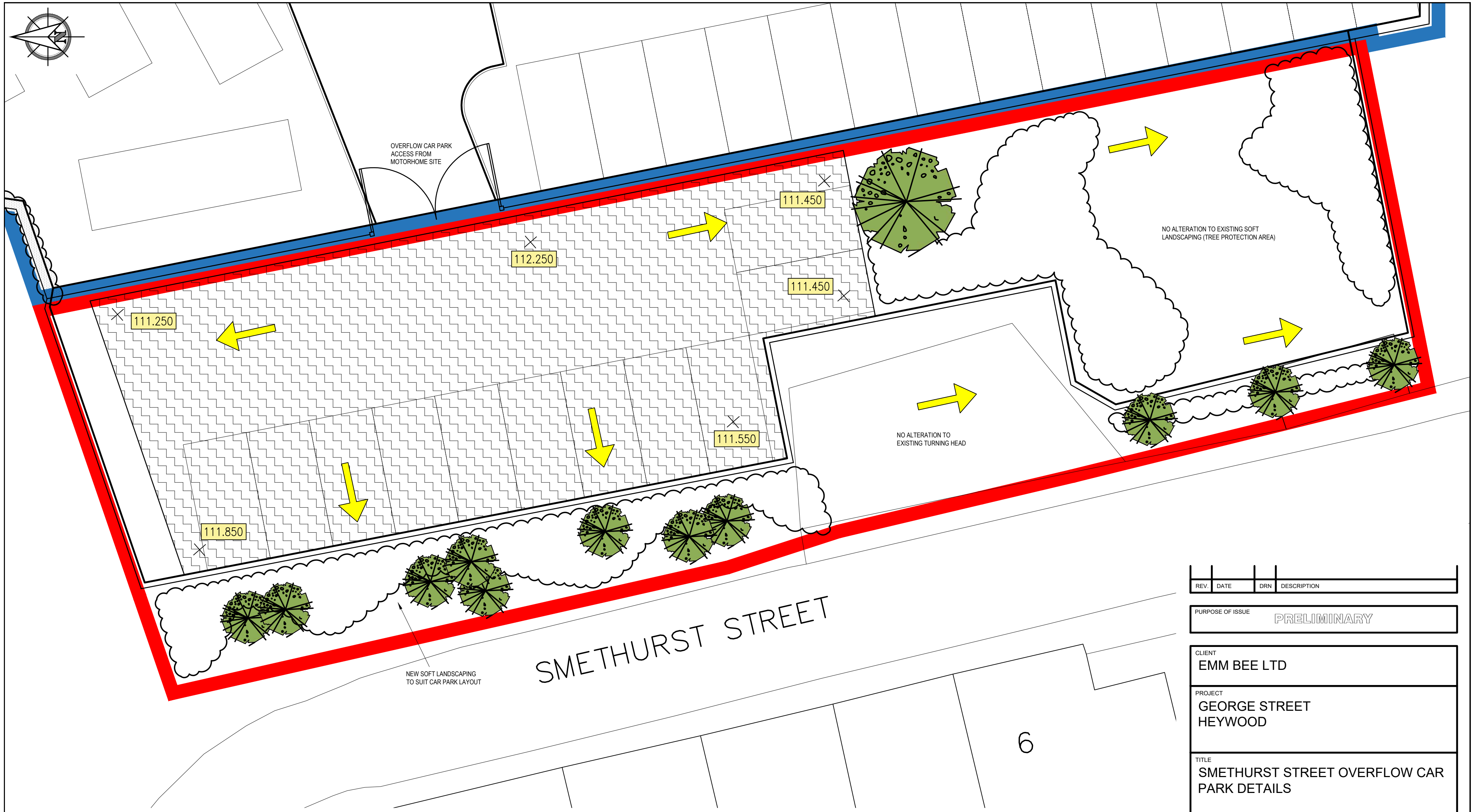
Storage is Online Cover Level (m) 111.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.18200	Width (m)	11.3
Membrane Percolation (mm/hr)	1000	Length (m)	27.8
Max Percolation (l/s)	87.3	Slope (1:X)	100.0
Safety Factor	3.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	110.450	Membrane Depth (m)	250

Appendix D
Drainage Drawings:-

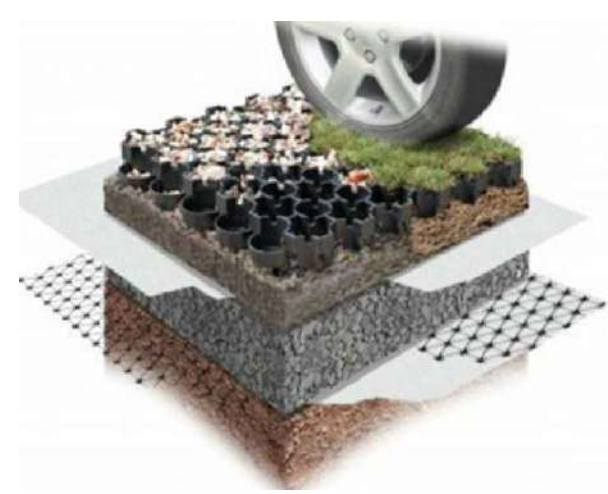
J122/14 – ‘Smethurst Street Overflow Car Park Details’



50 TERRAM BODPAVE 85 (OR SIMILAR) ON 50 BEDDING (10-12mm DIA ANGULAR GRAVEL) OFF TERRAM T1000 GEOTEXTILE OFF 150TH D.O.T. TYPE 3 (REDUCED FINES) OFF TENSAR TRIAX TX160 OVER TERRAM T1000 GEOTEXTILE BY MAIN CONTRACTOR

300TH FREE-DRAINING (40-75mm) GRANULAR MATERIAL (SEE E3P SPECIFICATION) OFF TENSAR SS40 GEO-GRID BY MAIN CONTRACTOR (SEE E3P SPECIFICATION)

EXISTING/REMIATED GROUND (SEE E3P SPECIFICATION)

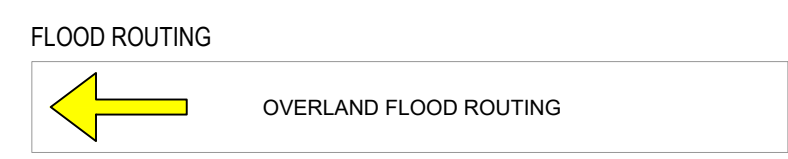


KEY

SITE AREA (700sq.m)

PERMEABLE PAVING TERRAM BODPAVE 85 (285sq.m)

INFILTRATION RATE 0.182m/hr



REV.	DATE	DRN	DESCRIPTION
PURPOSE OF ISSUE PRELIMINARY			
CLIENT EMM BEE LTD			
PROJECT GEORGE STREET HEYWOOD			
TITLE SMETHURST STREET OVERFLOW CAR PARK DETAILS			
JOB No. J122		DRAWING No. 14	
DRAWN JSD		CHECKED MD	SCALE 1:100 U.N.O.
		@ SHEET SIZE A2	DATE JULY 2023
DRAWING NOT TO BE SCALED			
Email: info@DandDconsulting.co.uk Web: www.DandDconsulting.co.uk			
Tel: 07884 975243 (J.Dickinson) 07884 936577 (M.Davenport)			
D and D consulting engineers			
D and D Consulting Engineers Ltd Labyrinth Business Centre, 45 Middle Hillgate, Stockport SK1 3DG			